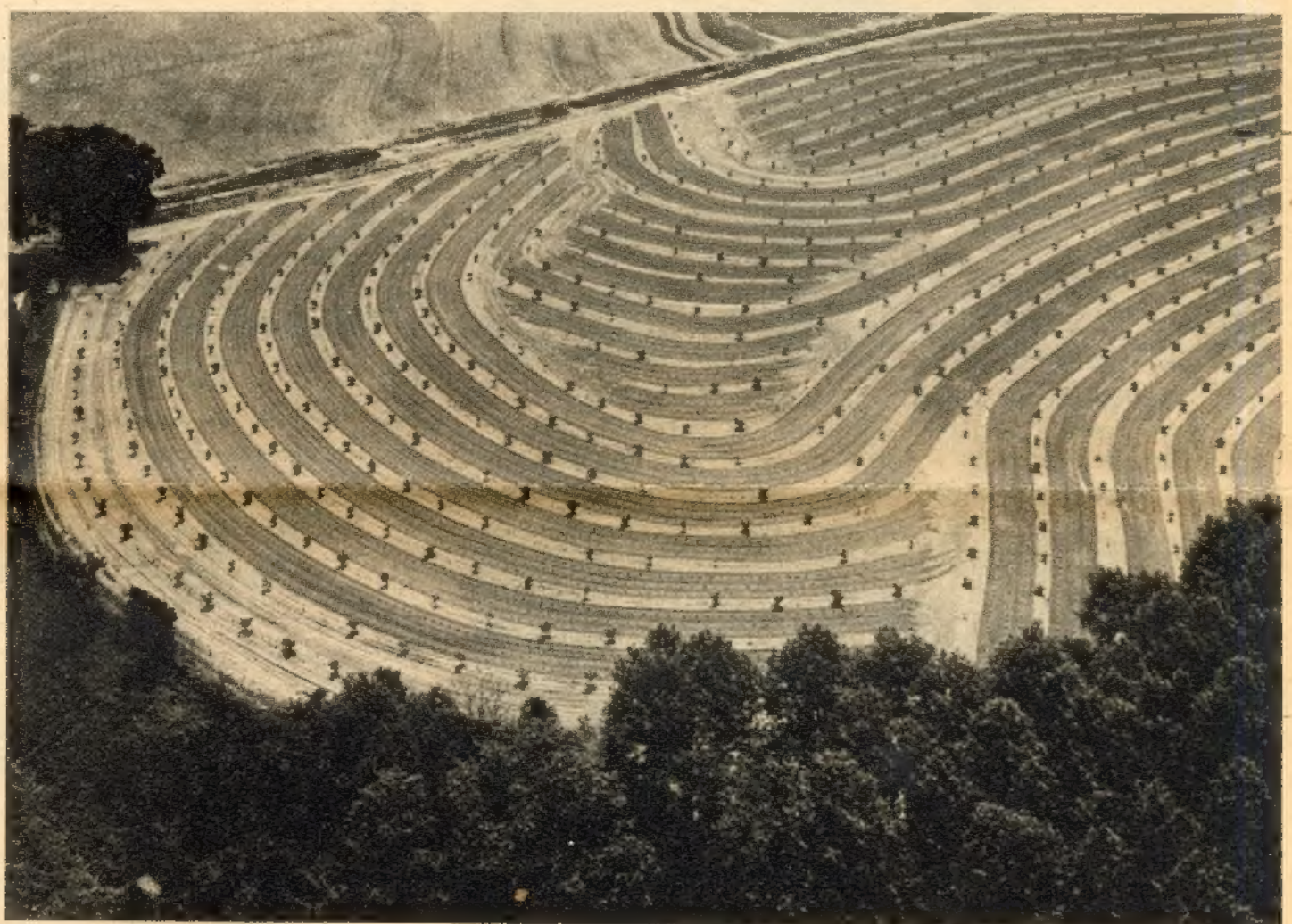




Highly attractive pattern is created by contour planting of nursery stock in South Jersey and that of a peach orchard (below) in Burlington County.

GUARDING the GOOD EARTH

*Conservation Helps Jersey
Keep \$400,000,000 Annual
Farm Income from Being
Blown Away by Nature in
'Dust Bowl' Proportions*



SOIL: The essence of life, the mother of seeds, the thin barrier between existence and oblivion.

Soil. Forget everything else—machines and callouses and new varieties and wonderful markets and crisp cellophane packages. Forget all but soil: without that six or eight or 10 inches of rich good earth there would be no farming in New Jersey or anywhere else. Nor, for that matter, would there be human life—without soil all the four-color ads and tractors and new plant varieties would be so much dust.

Possibly nowhere else in America is there so much varied soil in a concentrated area as there is in New Jersey. That is the main key to the Garden State, to its amazing variety of farm products, its diversified farm practices and the many problems of the farmer. The soils of Cape May County are no more like the soils of

By JOHN T. CUNNINGHAM

Sussex than the field of lima beans is like the hillside pasture.

Thus, New Jersey's \$400,000,000 annual farm income is literally rooted in the thin six-to-10-inch icing of soil atop the cake called Earth. It might be expected that with this prime dependence on his soil the farmer always would have guarded it far more carefully than he ever guarded his banks and his shops. Yet the story of soil in this country is the story of two centuries of spending it in reckless profligacy—and two decades of

desperately trying to atone for the agricultural sins of the fathers.

SOMETIMES nature gives awesome proof that it has become completely angered by man's inhumanity to the soil. New Jersey has been spared the fearsome spectacle of winds whipping soil away in clouds so dense as to darken the sun. There has been no Dust Bowl in the Garden State, no Okies fleeing before the Grapes of Wrath. Nor are there muddy waters dashing down ravines in what once were fertile fields.

Nevertheless dust storms do rise when hot summer winds sweep over South Jersey vegetable fields; deep gullies in pastures, in vegetable acres, and grain fields often give mute evidence that rich New Jersey top soil has gone to rest in bottomland stream beds. More insidiously, heavy rains relentlessly sheet off from unprotected fields imperceptibly thin layers of soil so valuable that its cost can't even be reckoned. But Jersey farmers, in general, fortunately are well aware they must conserve the gold on which they trod.

Conservation of this true wealth of the field is many things. It is contour plowing and strip cropping and field terraces and reforestation. It is fertilizer and lime and cover crops. It is planting crops adapted to whatever soil type is at hand. Paradoxically, since soil's worst enemy is too much water unleashed by savage rain storms, the New Jersey farmer also

This is the seventeenth in a series of articles on New Jersey's highly diversified agriculture, vigorous and growing despite the constant inroads of industrial and residential development. Next week: Marketing Farm Products.



ABOVE: Conservation measures on Salem division of Seabrook Farms.

BELOW: Contour plowing on farm near Swedesboro, Gloucester County.



has come to recognize that he must somehow save water in times of plenty against the day when his land is parched.

All this seems so fundamental that it is almost shocking to recognize that so few in America recognized it until all the nation watched Oklahoma's dust in the 1930s. That was tomorrow's shadow, the warning of things to come.

It set men to thinking and remembering. Some remembered 'way back to tales they had heard their grandfathers tell of farms laid waste in Hunterdon and Cumberland and Salem counties. They remembered reading of migrations from prostrated Salem County farms that led westward eventually all the way to Salem, Ore. They look about and saw a half million acres and more of New Jersey land that had once been farmland but now lay covered with scraggly growth struggling in impoverished soil.

AMERICA must have seemed to the first colonists like a heavily laden banquet table seems to a man dying from starvation. Most of the early settlers had come from countries where even a tiny patch of ground merited respect and careful attention. Here, in all this natural largess, the colonist forgot sound husbandry and laid to with frenzied carelessness. As the starved man eats his way to obesity, they plowed their way to ruin.

Almost a century of carefree spending of natural resources had gone by when Peter Kalm, celebrated Swedish botanist, visited America between 1748 and 1750. Kalm spent many months in New Jersey, observing particularly the habits of the South Jersey farmer. He watched in astonishment as farmers cleared a field, used it and abused it until the soil no longer held any plant food, then abandoned the field and started the cycle all over on another area.

Kalm concluded that the Jersey farmer—and all his American counterparts—knew precious little. "One can learn nothing (from farmers)," he wrote, "... except that from their gross mistakes and carelessness for futurity, one finds opportunities every day of making all sorts of observations, and growing wise at the expense of other people." As for natural history, he concluded, Americans looked upon that "as the pastime of fools."

Many New Jersey farmers ran out of fields to ruin between 1810 and 1850. So they packed their families and their few possessions in wagons and went West where virgin lands offered opportunity for even the most wasteful. Those who stayed behind hopefully hitched their futures to a team called marl and lime.

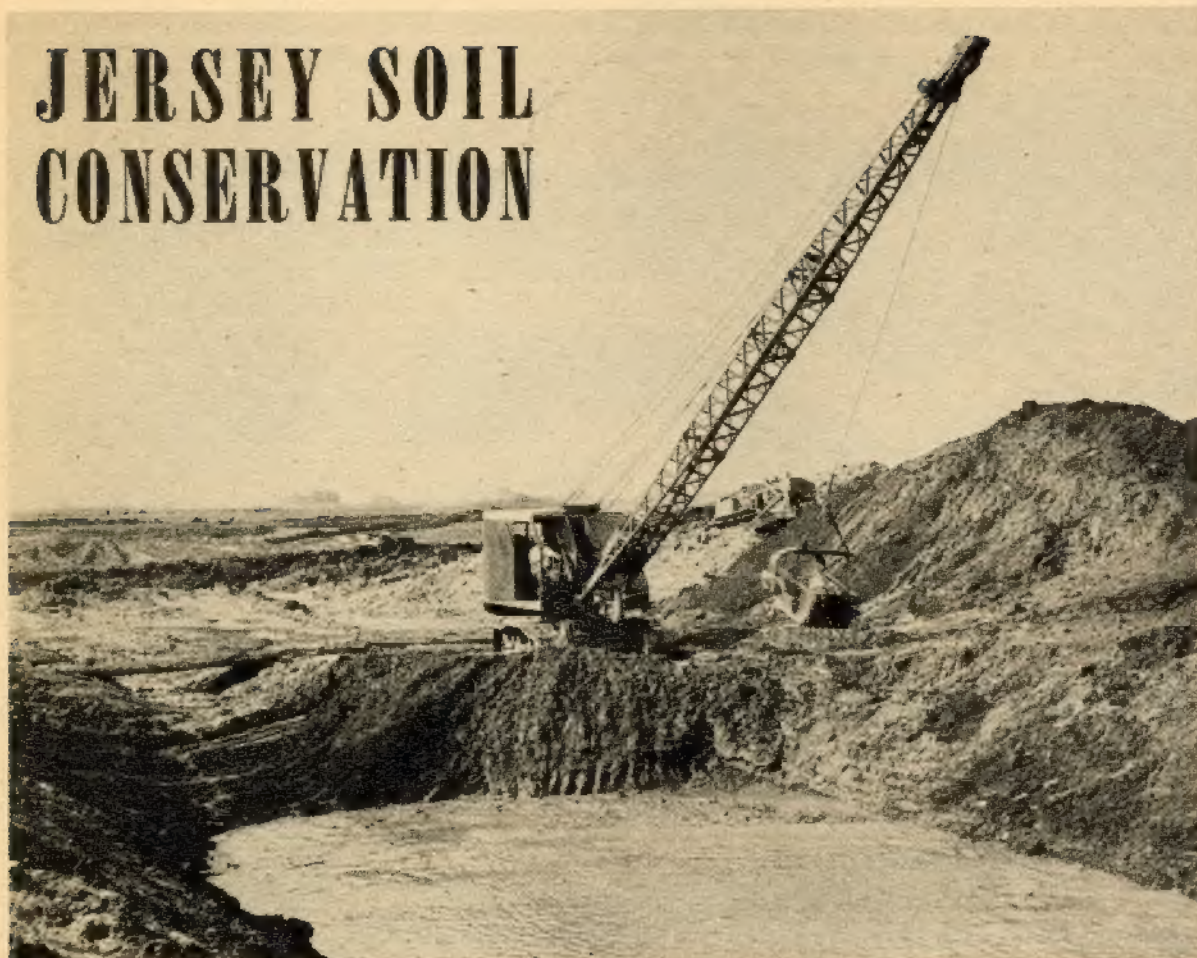
AN IRISHMAN, whose name eluded early historians, turned up a shovelful

(Continued on Following Page)



Severe gullying and erosion on a Camden County grape farm points up need of controlling water run-off and preventing soil erosion.

JERSEY SOIL CONSERVATION



Racing water that swept through a cornfield after a heavy rain in South Jersey created miniature copy of a dried-up Niagara Falls. LEFT: Digging pond as reservoir on Monmouth County potato farm.

(Continued From Preceding Page)
of blue-green mud in a Monmouth County meadow in 1768 and called it "marl." His employer, Peter Schenck, heeded the suggestion of the Son of the Ould Sod that marl be spread on the fields—and "its good effects were seen for many years." It took only two generations or so for the good effects to catch the eye of neighbors; by 1820 marl began to enrich more and more South Jersey fields as new beds of the marvelous mud became uncovered.

Still, the old prejudices against natural science persisted. Farmers had to be shown. They were. Marl on Salem County fields boosted corn yields 400 per cent. Because of its potash content, marl boosted potato crops tremendously. Land values climbed on a ladder of marl; by 1840 it had been claimed that marl boosted Monmouth County land values a half million dollars and Salem County acreage increased up to tenfold in value.

Similarly farmers had to see proof that the white layers of lime spread on a few New Jersey fields by 1800 did any good. The proof came; by 1850 lime kilns in Somerset, Hunterdon, Warren and Sussex counties began bringing a new lushness to upland grazing fields. Eventually farmers didn't fight lime any more; by 1880 they could look back and chuckle at the bad old days when they didn't use the white soil sweetener.

Marl had its limitations, chiefly its lack of nitrogen. Commercial fertilizers came to the fore, beginning with guano from the vast deposits in South America. Applied along with marl, guano earned the name of "farmers' gold-dust." In about 1850 a group of enterprising Cape May fishermen began netting menhaden and mossbunkers for fertilizer purposes. They became too enterprising; soon their nets caught alarming quantities of food fish too—leading to an 1885 act of the New Jersey Legislature making it illegal for menhaden boats to drag within three miles of the shore.

Yet of all the early commercial fertilizers, none had greater impact on farmers than the "nitrogenized superphosphate of lime" which James J. Mapes began manufacturing in Newark in about 1850. Mr. Mapes deserves to be remembered as the father of American chemical fertilizer; ironically, though, if he is remembered at all, it is as the father of Mary Mapes Dodge, author of "Hans Brinker, or the Silver Skates."

THE growth of cities—New York, Philadelphia, Newark and others—greatly helped New Jersey soil in somewhat roundabout fashion through the increased number of horses on city streets. Between 1880 and 1910 huge quantities of the sweepings from city pavements found their way back to the farm. Steam-drawn barges loaded with sweepings were pushed up creeks to South Jersey farmlands and long strings of manure-laden gondolas rolled over the railroads to vegetable patches the length and breadth of the state.

Then several things happened all of a sudden (sudden, that is, when it is considered that it takes Nature 500 to 600 years to build an inch of topsoil). The automobile pushed the horse off the streets and the tractor pushed him off the hills. New Jersey soil lost the city and barn sweepings, the source of badly needed humus. Simultaneously, farming became more intensified—meaning that farmers pushed the soil to set ever-higher yields, often abandoning the rotation which gives soils a chance to rest.

Pastures spread over hillsides to meet demands of the expanding dairy industry. That was good; pasturelands help keep the soil in place as nature intended. But, as the 20th Century dawned and moved along, more and more cropland in concentrated areas around the metropolitan sections of North Jersey and the wide open spaces of South Jersey became vegetable gardens. That was a mixed blessing. Vegetables are necessary, but at the same time, vegetable areas

are most subject to all the woes which beset conservationists.

INTENSIVE farming brought increased emphasis on soil enrichment. The farmer who resisted fertilization of his God-given acres wasn't rare by 1900—but he wasn't rich either. He may have grumbled that some had it better than others, but deep down in his heart the unsuccessful farmer knew (or at least suspected) that often the difference between prosperity and struggle was soil enrichment.

State agricultural leaders knew that, too, of course. One of the earliest activities of the New Jersey Board of Agriculture was establishment in 1874 of a careful analysis of all fertilizer sold in lots of more than 100 pounds. A state chemist inspected all fertilizer between 1874 until 1879, when the New Jersey Experiment Station at Rutgers took over the duty. Fertilizer makers didn't exactly cherish the check on their wares; in 1887 a national fertilizer combine unsuccessfully sought to exclude from federal funds any experiment station which published results of fertilizer analyses.

Fifteen New Jersey firms sold some \$300,000 worth of commercial fertilizer in 1875. Five years later the Garden State fertilizer bill had increased to \$1,600,000, by 1900 the figure had risen to \$2,165,000. Today, just to show that fertilizer is here to stay, New Jersey farmers set aside \$11,000,000 annually for that purpose. That, incidentally, buys some 900,000,000 pounds of fertilizer for each year, which divides up to about 626 pounds per harvested acre in the state—compared with a national average of 119 pounds.

THUS the soil isn't being forgotten as far as feeding is concerned. Nor, to mix a metaphor, is the hand doing the feeding being bitten. Crop yields have risen sensationally since 1900—up 100 per cent in most cases, up 400 to 500 per cent in a few instances. Not all of this is due to a better menu for the soil; obviously improved insecticides, new plant varieties, irrigation

and other factors are important. Nonetheless, credit soil enrichment for most of the increase.

New Jersey soils must be enriched, since in general they are not naturally highly fertile and even those which are rich have been farmed so many years they need enrichment. Further, there is so much variety; depending on location, New Jersey soil is crumbly, clayey, rubbly, hard-packed, shaly, sandy, loamy, pebbly, stone-filled. It lays over country that is marshy, flat, rolling, hilly or mountainous. That is variety—and variety is not necessarily spice to the agriculturist.

But all the feeding in the world comes to naught if it doesn't stay in the ground for the hungry roots reaching down for sustenance. That—not soil enrichment—is the aching problem of mid-20th century. That is where conservation enters the picture.

Scientists long had known that water and wind could carry away in a few years soil which had taken thousands of years to build. President Theodore Roosevelt recognized the savage depletion of the soil and all natural resources when he called a conference of conservationists in 1908. Still the waste went on.

DRAMATICALLY the entire problem exploded in the early 1930s. Marginal farms collapsed in the wake of the Great Depression. Nature stepped in, sent winds swirling over Oklahoma and kicked up a dust storm of national importance. All of the media of public information overnight became aware that Teddy Roosevelt had been right back in 1908; now most of them supported President Franklin D. Roosevelt's sweeping plan for soil conservation.

Oh sure, many a big city taxpayer cried bitterly about boondoggling and many a farmer stubbornly resisted any bureaucrat telling the land owner what to do even for his own benefit. But the Federal Soil Conservation Service was born and grew on the misery of deep farm gullies and eroded

hillsides. Here in New Jersey, the Legislature in 1937 established a State Soil Conservation Committee, comprised of leaders of all major farm interests.

New Jersey had no Dust Bowl drama as far as soil losses were concerned. Not many deep gullies caught the eyes of photographers, no migrants tugged at the sympathy of novelists. Scientists knew the costly toll taken annually in the state, but most of the real proof of soil loss lay quietly and unphotogenically hidden on reservoir and lake bottoms where topsoil came to rest after sheeting off the hillsides.

AT PRINCETON University's Carnegie Lake, soil conservationists had startling proof of soil erosion in just one small watershed. In 1937 and 1938, for example, dredgers took from Carnegie Lake close to 160,000 cubic yards of soil washed from farmland in the surrounding watershed (and if you think that isn't a costly bit of erosion, you haven't bought any topsoil lately). The shocking proof of erosion's work eluded most; there was somewhat more concern over the fact that the rowing coach's motorboat had been having difficulty getting back and forth to the boathouse because of sedimentation.

In Monmouth County, a Soil Conservation Service field laboratory at Marlboro disclosed other startling facts: That vegetable plots unprotected by a winter crop lost up to 19 tons of soil per acre per year, that eroded land yielded 70 fewer bushels of potatoes per acre than uneroded land, that unprotected land lost as much as 500 pounds of plant food annually. Now they were talking; soil was MONEY—and too much of it was going down the creek.

Other disturbing statistics came home forcibly to the New Jersey farmer. A 1938 survey declared half of the state's farm acres had serious erosion problems, costing farmers at least \$5,000,000 per year. A soil conservation project on Pennsauken Creek in Burlington-Camden counties showed that serious soil erosion existed even on vegetable farms with almost imperceptible slopes.

All right, all right, said serious farmers. We're convinced. What can we do about it?

WISELY the Soil Conservation Service shucked off the onus of federal control and acted through local district committees, setting up the first one in Monmouth County in 1938 and gradually organizing others (there are now 12 in the state). The committees, composed of leading dirt farmers, took away the curse a government program sometimes carried (particularly where the farmers felt that if they were tossing money down a gully it was no concern of Washington's).

The work of soil conservation in New Jersey has gone on steadily, if unspectacularly. First of all, and perhaps most important, much farmer inertia has been largely overcome; nearly 6,000 farmers (owning 642,000 acres) have sought official conservation advice. Most farmers recognize

the need for conservation, despite the fact that through intensified cultivation their farms now yield more than ever before. Most recognize that conservation, costly at first, can actually make money in the long haul.

Elsewhere, a firm basis for action has been laid. A complete new soil survey for conservation planning has been made on 2,700,000 New Jersey acres—about 57 per cent of the state. District planning has helped put conservation on an area basis—extremely important, because one farm completely terraced and contour-plowed is of questionable value if its waters only drain off to make deeper gullies on a neighbor's acres.

Soil conservation involves a wide variety of concepts. Terraces, for example, hold and divert water which once cascaded down steep slopes. Contour plowing follows the natural curving of the land and combats old methods of "square farming on a round surface." Strip cropping alternates hay fields in sod with cultivated vegetable fields. Trees help break the force of sweeping winds, help retain moisture in the soil.

CONSERVATION is at least a two-edged sword. First of all it prevents rain waters from carrying off precious topsoil. Secondly, it seeks to retain for future emergency drought use as much of the rain as possible. What can't be slowed up to seep gradually into the soil might be caught in man-made farm ponds. At any rate, that's the recommendation—and farmers are taking heed; in Monmouth County alone last year more than 50 such ponds were dug.

Water is every bit as vital to the farmer today as it is to his cousins who own the big city factories, even if some rural legislators are a mite slow to recognize the fact. Two decades ago an irrigated field was a novelty in New Jersey; now Garden State farmers have well over 65,000

acres under irrigation. Last year's prolonged drought made it certain that irrigation installations will increase rapidly.

The trend in irrigation today is toward light portable systems, readily moved from field to field. Thus, a farmer with 200 acres of vegetables can irrigate it all by soaking one area, then picking up the pipe and moving it to another area. However, if he wished to put an inch a week on his 200 acres, he would use 5,430,000 gallons of water every week! To get some concept of water as it pertains to farmers, it would take 1,760,000,000 gallons of water every week to put an inch of water on the New Jersey acreage now under irrigation. Certainly, then, water is far from the concern of city slickers alone.

Conservation, therefore, is a paradox for the farmer. He fertilizes his soil, enriches it so it produces heavily. But, if he does nothing, both soil and fertilizer may wash away. So he fights his worst enemy, water, in every way possible. But he needs water desperately, too, when the rains have stopped and the hot sun beats mercilessly down.

IT ALL costs money—farm ponds, terraces, strip cropping, trees, drainage ditches. The farmer who decides he can't go another year without bringing his soil and water practices up to the minute must spend money. Fortunately, however, there is some help available.

He can get rapid and sure chemical analysis of his soil without cost, and know what kind and what amount of fertilizer he needs. The same analysis will tell him how much lime his starving fields require. This service is only as far away as the telephone number of the county agricultural agent.

Right in the same office with the agent is a representative of the Soil Conservation Service, willing—yeah eager—to come out and look over a

farm to recommend a plan for sound conservation of soil and water. That service is free. The farmer gets a detailed map of his acreage, showing what should be done. He sees how his farm relates to his neighbors. He sees what should be terraced, what contoured, what strip-cropped. He knows where his farm pond should be, how large it should be.

He can find everything, in short, except where the money can be had. He can look for a bit of help in that direction from the Agricultural Stabilization and Conservation Committee, the federal agency whose responsibility it is to provide partial funds to help soil conservation development. The committee, with headquarters in New Brunswick, works through grass roots committees in each county. As might be expected, it also works closely with all other established agricultural agencies.

WHATEVER help the farmer gets depends on Congress, but ASCC funds for New Jersey each year range in the neighborhood of \$700,000. This can be used for many purposes: Permanent practices (terraces, contours, etc.); semipermanent practices (wood-land management, reseeding pastures, etc.), and recurring practices (cover crops, liming, etc.).

The Agricultural Stabilization and Conservation Committee looks upon its allocated money primarily as priming funds. Its philosophy: Good soil practices aided by ASCC funds in one year should show sufficient benefit to the farmer to encourage him to carry on with his own money. No farmer can get more than \$1,500 in one year, no single project can get more than 50 per cent of its cost.

Now, only two decades since soil conservation first became a full-scale national worry, New Jersey farmers are well along in the movement. Big corporations like Seabrook Farms and Campbell Soup in South Jersey are pushing conservation, but thousands of individual farmers are on the bandwagon too. The great limitation is available cash—but mortgage lenders at last are fully aware that a series of new field terraces can be as good a farm risk as a new cow barn.

ONE of the most prominent conservation methods is the winter cover crop; prominent possibly because it is both inexpensive and good. A cover crop—rye or wheat, for example—is planted in the fall and stays in place all winter. Planted on a bare slope after vegetables have been harvested, the cover crop serves to hold soil in place against winter erosion. Then, in the spring, the cover is turned under by plow and acts both to enrich the soil and to increase its humus content.

Relentlessly, nonetheless, nature goes on, seeking ever to wrest back what man has borrowed. The less the farmer regards natural science as "a pastime of fools," the better he prospers. The more he recognizes the fierce destruction wrought by a pounding rain storm the less wealth he finds washed from his fields. Soil saved is money earned; whoever disregards his soil is like a banker who tosses dollar bills into the wind.



While not as spectacular as a gully, this form of erosion known as "sheeting" is considered worst enemy of New Jersey farmers.